


# TCEQ Interoffice Memorandum

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**To:** Tony Walker  
Director, TCEQ Region 4, Dallas/Fort Worth  
Alyssa Taylor  
Air Section Manager, TCEQ Region 4, Dallas/Fort Worth

**From:** Carla Kinslow, Ph.D.   
Toxicology Division, Chief Engineer's Office

**Date:** December 15, 2011

**Subject:** Toxicological Evaluation of Results from an Ambient Air Sample for Volatile Organic Compounds Collected Downwind of the Jetta Davis 1H Site at Latitude 33.69936, Longitude -96.77506, in Sherman, Grayson County, Texas  
Sample Collected on August 2, 2011, ACL 1108022 (Lab Samples 1108022-001)

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## Key Points

- The reported concentrations of two chemicals in Lab Sample 1108022-001 exceeded their respective odor air monitoring comparison values (AMCVs) (Table 1). The reported levels of these chemicals would be expected to cause odors, which is consistent with a citizen's complaint of a propane-like odor. In addition, Texas Commission on Environmental Quality (TCEQ) regional staff reported a very strong continuous natural gas odor during the sampling event. Persistent or recurrent exposure to levels which significantly exceed the odor threshold may cause odor-related health effects in some individuals, including nausea and headache. The remaining 82 target volatile organic compounds (VOCs) were either not detected or were detected below their respective short-term AMCVs and would not be expected to cause short-term adverse health effects, adverse vegetative effects, or odors.
- The monitored concentration of benzene in Lab Sample 1108022-001 did not exceed the short-term, health AMCV, but is considered elevated above typical background concentrations and could potentially contribute to an elevated long-term (i.e., lifetime) cumulative exposure level.

## Background

On August 2, 2011, a TCEQ Region 4 Air Investigator collected a 30-minute canister sample downwind of the Jetta Davis 1H Site in Sherman, Grayson County, Texas (Latitude 33.69936, Longitude -96.77506). The sample was collected in response to a citizen's complaint of a propane-like odor as well as difficulty breathing, coughing, tightness in chest, burning eyes, headache, nausea, burning in throat. The investigator noted a very strong continuous natural gas odor when collecting the downwind sample. Meteorological conditions measured at the site or

nearest stationary ambient air monitoring site indicated that the temperature was 112°F, the relative humidity was 24%, and winds were from the south-southwest (200°) at 3.4 mph during the sampling event. The sample was collected less than 100 feet downwind from tanks at the facility. The nearest location where the public could have access was approximately 100-300 feet from the potential source and/or the facility. The sample was sent to the TCEQ laboratory in Austin, Texas, and analyzed for a range of VOCs. The list of the target analytes that were evaluated in this review are provided in Attachment A. The VOC concentrations were reported in parts per billion by volume (ppb<sub>v</sub>) (Attachment B and Table 2). Please note that the available canister technology and analysis method can not capture and/or analyze for all chemicals.

## **Results and Evaluation**

Reported VOC concentrations were compared to TCEQ short-term health- and/or welfare-based AMCVs (Table 2). Short-term AMCVs are guidelines used to evaluate ambient concentrations of a chemical in air and to determine its potential to result in adverse health effects, adverse vegetative effects, or odors. Health AMCVs are set to provide a margin of safety, and are set well below levels at which adverse health effects are reported in the scientific literature. If a chemical concentration in ambient air is less than its comparison value, no adverse health effects are expected to occur. If a chemical concentration exceeds its comparison value it does not necessarily mean that adverse effects will occur, but rather that further evaluation is warranted.

Eighty-two of the 84 VOCs in Lab Sample 1108022-001 were either not detected or were detected below their respective short-term AMCVs. Exposure to levels of these 82 VOCs would not be expected to cause short-term adverse health effects, adverse vegetative effects, or odors.

The reported concentrations of two chemicals (2-methylpentane and n-pentane) exceeded their respective odor AMCVs (Table 1). The reported levels of these chemicals would be expected to cause odors, which is consistent with a citizen's complaint of a propane-like odor. TCEQ regional staff also reported a very strong and constant natural gas odor during their investigation/sampling event. Persistent or recurrent exposure to levels which significantly exceed the odor threshold may cause odor-related health effects in some individuals, including nausea and headache.

The TD also recognizes that the monitored concentration of benzene (22 ppb<sub>v</sub>) in Lab Sample 1108022-001 did not exceed the short-term, health AMCV and is below a level of short-term health concern but is considered elevated above typical background concentrations. Although the monitored concentration of benzene is not a short-term health concern, an elevated short-term level may potentially contribute to an elevated long-term (i.e., lifetime) cumulative exposure level that could be a concern because benzene is a known human carcinogen.

Please call me at (713) 422-8976 if you have any questions regarding this evaluation.

**Table 1. Exceedances in Lab Sample 1108022-001**

<b>Chemical</b>	<b>Measured Concentration (ppb<sub>v</sub>)</b>	<b>Short-term health AMCV (ppb<sub>v</sub>)</b>	<b>Short-term odor AMCV (ppb<sub>v</sub>)</b>	<b>Does it exceed the short-term, health AMCV ?</b>	<b>Does it exceed the short-term, odor AMCV ?</b>
2-methylpentane	230	1,000	83	No	Yes
n-pentane	1600	68,000	1,400	No	Yes

## Attachment A

### List of Target Analytes for Canister Samples

ethane	4-methyl-1-pentene	t-1,3-dichloropropylene
ethylene	1,1-dichloroethane	1,1,2-trichloroethane
acetylene	cyclopentane	2,3,4-trimethylpentane
propane	2,3-dimethylbutane	toluene
propylene	2-methylpentane	2-methylheptane
dichlorodifluoromethane	3-methylpentane	3-methylheptane
methyl chloride	2-methyl-1-pentene + 1-hexene	1,2-dibromoethane
isobutane	n-hexane	n-octane
vinyl chloride	chloroform	tetrachloroethylene
1-butene	t-2-hexene	chlorobenzene
1,3-butadiene	c-2-hexene	ethylbenzene
n-butane	1,2-dichloroethane	m & p-xylene
t-2-butene	methylcyclopentane	styrene
bromomethane	2,4-dimethylpentane	1,1,2,2-tetrachloroethane
c-2-butene	1,1,1-trichloroethane	o-xylene
3-methyl-1-butene	benzene	n-nonane
isopentane	carbon tetrachloride	isopropylbenzene
trichlorofluoromethane	cyclohexane	n-propylbenzene
1-pentene	2-methylhexane	m-ethyltoluene
n-pentane	2,3-dimethylpentane	p-ethyltoluene
isoprene	3-methylhexane	1,3,5-trimethylbenzene
t-2-pentene	1,2-dichloropropane	o-ethyltoluene
1,1-dichloroethylene	trichloroethylene	1,2,4-trimethylbenzene
c-2-pentene	2,2,4-trimethylpentane	n-decane
methylene chloride	2-chloropentane	1,2,3-trimethylbenzene
2-methyl-2-butene	n-heptane	m-diethylbenzene
2,2-dimethylbutane	c-1,3-dichloropropylene	p-diethylbenzene
cyclopentene	methylcyclohexane	n-undecane

## Attachment B

8/8/2011

### Texas Commission on Environmental Quality

Laboratory and Quality Assurance Section  
P.O. Box 13087, MC-165  
Austin, Texas 78711-3087  
(512) 239-1716

### Laboratory Analysis Results

ACL Number: 1108022

ACL Lead: David Manis

Region: T04

Date Received: 8/4/2011

Project(s): Barnett Shale

Facility(ies) Sampled	City	County	Facility Type
Jetta	Sherman	Grayson	

#### Laboratory Procedure(s) Performed:

Analysis: AMOR006

Determination of VOC Canisters by GC/MS Using Modified Method TO-15

#### Procedure:

Prior to analysis, subatmospheric samples are pressurized to twice the collected volume using a sample dilution system. For analysis, a known volume of a sample is directed from the canister into a multitrapp cryogenic concentrator. Internal standards are added to the sample stream prior to the trap. The concentrated sample is thermally desorbed and carried onto a GC column for separation. The analytical strategy involves using a GC with dual columns that are coupled to a mass selective detector (MSD) and a flame ionization detector (FID). Mass spectra for individual peaks in the total ion chromatogram are then used for target compound identification and quantitation. The fragmentation pattern is compared with stored spectra taken under similar conditions in order to identify the compound. For any given compound, the intensity of the quantitation fragment is compared with the system response to the fragment for known amounts of the compound. This establishes the compound concentration in the sample. For non-target compound peaks which are at least one-half the height of the internal standard, a library search is performed in an attempt to identify the compound solely upon fracture patterns. These tentatively identified compounds (TICs) are reported as a sample specific footnote. Accurate quantitation of TICs is not possible. The FID is used for the quantitation of ethane, ethylene, acetylene, propylene and propane and identification is based on matching retention times of standards containing known analytes.

#### Sample(s) Received

Field ID Number: N1099-080211

Laboratory Sample Number: 1108022-001

Sampled by: Kijun Hong

Sampling Site: Davis 1H

Date & Time Sampled: 08/02/11 15:55:00 Valid Sample: Yes

#### Comments:

Canister N1099 was used to collect a 30-minute sample using OFC-058.

Please note that this analytical technique is not capable of measuring all compounds which might have adverse health effects. For questions on the analytical procedures please contact the laboratory manager at (512) 239-4894. For an update on the health effects evaluation of these data, please contact the Toxicology Division at (512) 239-1795.

Analyst: Jaydeep Patel  
Jaydeep Patel

Date: 08/08/11

Reviewed By: David Manis (Acting)  
David Manis (Acting)

Date: 8/8/11

Technical Specialist: David Manis  
David Manis

Date: 8/8/11

### Laboratory Analysis Results

ACL Number: 1108022

Analysis Code: AMOR006

Note: Results are reported in units of parts per billion by volume (ppbv)							
Lab ID	1108022-001						
Compound	LOD	Concentration	SDL	Flags**	Concentration	SDL	Flags**
3-methylhexane	0.20	49	5.1	D1			
1,2-dichloropropane	0.17	ND	4.3	D1			
trichloroethylene	0.29	ND	7.4	D1			
2,2,4-trimethylpentane	0.24	ND	6.1	D1			
2-chloropentane	0.27	ND	6.8	D1			
n-heptane	0.25	180	6.3	D1			
c-1,3-dichloropropylene	0.20	ND	5.1	D1			
methylcyclohexane	0.26	94	6.6	D1			
t-1,3-dichloropropylene	0.20	ND	5.1	D1			
1,1,2-trichloroethane	0.21	ND	5.3	D1			
2,3,4-trimethylpentane	0.24	ND	6.1	D1			
toluene	0.27	20	6.8	D1			
2-methylheptane	0.20	18	5.1	D1			
3-methylheptane	0.23	7.3	5.8	L,D1			
1,2-dibromoethane	0.20	0.10	5.1	J,D1			
n-octane	0.19	47	4.8	D1			
tetrachloroethylene	0.24	ND	6.1	D1			
chlorobenzene	0.27	ND	6.8	D1			
ethylbenzene	0.27	5.5	6.8	J,D1			
m & p-xylene	0.27	9.2	6.8	L,D1			
styrene	0.27	ND	6.8	D1			
1,1,2,2-tetrachloroethane	0.20	ND	5.1	D1			
o-xylene	0.27	4.3	6.8	J,D1			
n-nonane	0.22	11	5.6	L,D1			
isopropylbenzene	0.24	3.3	6.1	J,D1			
n-propylbenzene	0.27	ND	6.8	D1			
m-ethyltoluene	0.11	ND	2.8	D1			
p-ethyltoluene	0.16	0.22	4.1	J,D1			
1,3,5-trimethylbenzene	0.25	0.16	6.3	J,D1			
o-ethyltoluene	0.13	ND	3.3	D1			
1,2,4-trimethylbenzene	0.27	0.76	6.8	J,D1			
n-decane	0.27	4.3	6.8	J,D1			
1,2,3-trimethylbenzene	0.27	ND	6.8	D1			
m-diethylbenzene	0.27	ND	6.8	D1			
p-diethylbenzene	0.27	ND	6.8	D1			
n-undecane	0.27	1.7	6.8	J,D1			

### Laboratory Analysis Results

ACL Number: 1108022

Analysis Code: AMOR006

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Note: Results are reported in units of parts per billion by volume ( ppbv)

LOD - Limit of Detection.

ND - not detected

NQ - concentration can not be quantified.

SDL - Sample Detection Limit (LOD adjusted for dilutions).

INV - Invalid.

J - Reported concentration is below SDL.

L - Reported concentration is at or above the SDL and is below the lower limit of quantitation.

E - Reported concentration exceeds the upper limit of instrument calibration.

M - Result modified from previous result.

T - Data was not confirmed by a confirmational analysis. Data is tentatively identified.

\* SDL is equal to LOD

\*\* Quality control flags explanations are listed on the last page of this report.

TCEQ laboratory customer support may be reached at [kbachtel@tceq.state.tx.us](mailto:kbachtel@tceq.state.tx.us)

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### Laboratory Analysis Results

ACL Number: 1108022

Analysis Code: AMOR006

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#### Quality Control Notes:

D1-sample concentration was calculated using a dilution factor of 50.69

D2-sample concentration was calculated using a dilution factor of 200.54 and the diluted sample was analyzed on 08/05/2011.

D3-sample concentration was calculated using a dilution factor of 401.08 and the diluted sample was analyzed on 08/07/2011.

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**Table 2 Comparison of Monitored Concentrations in Lab Sample 1108022-001 to TCEQ Short-Term AMCVs**

Lab Sample ID	1108022-001					
Compound	Odor AMCV (ppb <sub>v</sub> )	Short-Term Health AMCV (ppb <sub>v</sub> )	LOD (ppb <sub>v</sub> )	Concentrations (ppb <sub>v</sub> )	Flags	SDL (ppb <sub>v</sub> )
1,1,1-Trichloroethane	380,000	1,700	0.26	ND	D1	6.6
1,1,2,2-Tetrachloroethane	7,300	10	0.2	ND	D1	5.1
1,1,2-Trichloroethane	Not Available	100	0.21	ND	D1	5.3
1,1-Dichloroethane	110,000	1,000	0.19	ND	D1	4.8
1,1-Dichloroethylene	Not Available	180	0.18	ND	D1	4.6
1,2,3-Trimethylbenzene	Not Available	250	0.27	ND	D1	6.8
1,2,4-Trimethylbenzene	Not Available	250	0.27	0.76	J,D1	6.8
1,2-Dibromoethane	10,000	0.5	0.2	0.1	J,D1	5.1
1,2-Dichloroethane	6,000	40	0.27	ND	D1	6.8
1,2-Dichloropropane	250	100	0.17	ND	D1	4.3
1,3,5-Trimethylbenzene	Not Available	250	0.25	0.16	J,D1	6.3
1,3-Butadiene	230	1,700	0.27	ND	D1	6.8
1-Butene	360	50,000	0.2	11	L,D1	5.1
1-Pentene	100	2,600	0.27	2.2	J,D1	6.8
2,2,4-Trimethylpentane	Not Available	750	0.24	ND	D1	6.1
2,2-Dimethylbutane (Neohexane)	Not Available	1,000	0.21	3.5	J,D1	5.3
2,3,4-Trimethylpentane	Not Available	750	0.24	ND	D1	6.1
2,3-Dimethylbutane	Not Available	990	0.28	20	D1	7.1
2,3-Dimethylpentane	Not Available	850	0.26	17	D1	6.6
2,4-Dimethylpentane	290,000	850	0.27	4	J,D1	6.8
2-Chloropentane (as chloroethane)	Not Available	190	0.27	ND	D1	6.8
2-Methyl-1-Pentene +1-Hexene	20	500	0.2	0.96	J,D1	5.1
2-Methyl-2-Butene	250	500	0.23	ND	D1	5.8
2-Methylheptane	Not Available	750	0.2	18	D1	5.1

Lab Sample ID	1108022-001					
Compound	Odor AMCV (ppb <sub>v</sub> )	Short-Term Health AMCV (ppb <sub>v</sub> )	LOD (ppb <sub>v</sub> )	Concentrations (ppb <sub>v</sub> )	Flags	SDL (ppb <sub>v</sub> )
2-Methylhexane	Not Available	750	0.27	35	D1	6.8
2-Methylpentane (Isohexane)	83	1,000	0.27	230	D1	6.8
3-Methyl-1-Butene	250	8,000	0.23	ND	D1	5.8
3-Methylheptane	Not Available	750	0.23	7.3	L,D1	5.8
3-Methylhexane	Not Available	750	0.2	49	D1	5.1
3-Methylpentane	Not Available	1,000	0.23	130	D1	5.8
4-Methyl-1-Pentene (as hexene)	20	500	0.22	ND	D1	5.6
Acetylene	620,000	25,000	0.5	ND	T,D1	13
Benzene	2,700	180	0.27	22	D1	6.8
Bromomethane (methyl bromide)	21,000	30	0.27	ND	D1	6.8
c-1,3-Dichloropropylene	Not Available	10	0.2	ND	D1	5.1
c-2-Butene	2,100	15,000	0.27	ND	D1	6.8
c-2-Hexene	Not Available	500	0.27	ND	D1	6.8
c-2-Pentene	Not Available	2,600	0.25	ND	D1	6.3
Carbon Tetrachloride	97,000	20	0.27	ND	D1	6.8
Chlorobenzene (phenyl chloride)	210	100	0.27	ND	D1	6.8
Chloroform (trichloromethane)	85,000	20	0.21	ND	D1	5.3
Cyclohexane	420	1,000	0.24	110	D1	6.1
Cyclopentane	Not Available	1,200	0.27	94	D1	6.8
Cyclopentene	Not Available	2,900	0.2	ND	D1	5.1
Dichlorodifluoromethane	Not Available	10,000	0.2	ND	D1	5.1
Ethane	180,000	Simple Asphyxiant*	0.5	4400	T,D1	13
Ethylbenzene	170	20,000	0.27	5.5	J,D1	6.8
Ethylene	270,000	500,000	0.5	1.9	J,T,D1	13
Isobutane	2,040	8,000	0.23	1400	D2	5.8

Lab Sample ID	1108022-001					
Compound	Odor AMCV (ppb <sub>v</sub> )	Short-Term Health AMCV (ppb <sub>v</sub> )	LOD (ppb <sub>v</sub> )	Concentrations (ppb <sub>v</sub> )	Flags	SDL (ppb <sub>v</sub> )
Isopentane (2-methylbutane)	1,300	68,000	0.27	920	D2	6.8
Isoprene	5	20	0.27	ND	D1	6.8
Isopropylbenzene (cumene)	100	500	0.24	3.3	J,D1	6.1
m & p-Xylene (as mixed isomers)	80	1,700	0.27	9.2	L,D1	6.8
m-Diethylbenzene	70	460	0.27	ND	D1	6.8
Methyl Chloride (chloromethane)	Not Available	500	0.2	14	L,D1	5.1
Methylcyclohexane	150	4,000	0.26	94	D1	6.6
Methylcyclopentane	1,700	750	0.27	200	D1	6.8
Methylene Chloride (dichloromethane)	160,000	3,500	0.14	ND	D1	3.5
m-Ethyltoluene	18	250	0.11	ND	D1	2.8
n-Butane	1,200,000	8,000	0.2	4700	D3	5.1
n-Decane	620	1,750	0.27	4.3	J,D1	6.8
n-Heptane	670	850	0.25	180	D1	6.3
n-Hexane	1,500	1,800	0.2	410	D2	5.1
n-Nonane	2,200	2,000	0.22	11	L,D1	5.6
n-Octane	1,700	750	0.19	47	D1	4.8
n-Pentane	1,400	68,000	0.27	1600	D2	6.8
n-Propylbenzene	3.8	250	0.27	ND	D1	6.8
n-Undecane	Not Available	550	0.27	1.7	J,D1	6.8
o-Ethyltoluene	Not Available	250	0.13	ND	D1	3.3
o-Xylene	380	1,700	0.27	4.3	J,D1	6.8
p-Diethylbenzene	0.39	460	0.27	ND	D1	6.8
p-Ethyltoluene	8.3	250	0.16	0.22	J,D1	4.1
Propane	1,500,000	Simple Asphyxiant*	0.5	7400	T,D2	13
Propylene	13,000	Simple Asphyxiant*	0.5	9.9	J,T,D1	13

Lab Sample ID	1108022-001					
Compound	Odor AMCV (ppb <sub>v</sub> )	Short-Term Health AMCV (ppb <sub>v</sub> )	LOD (ppb <sub>v</sub> )	Concentrations (ppb <sub>v</sub> )	Flags	SDL (ppb <sub>v</sub> )
Styrene	25	5,100	0.27	ND	D1	6.8
t-1,3-Dichloropropylene	Not Available	10	0.2	ND	D1	5.1
t-2-Butene	2,100	15,000	0.18	ND	D1	4.6
t-2-Hexene	Not Available	500	0.27	ND	D1	6.8
t-2-Pentene	Not Available	2,600	0.27	ND	D1	6.8
Tetrachloroethylene	770	1,000	0.24	ND	D1	6.1
Toluene	170	4,000	0.27	20	D1	6.8
Trichloroethylene	3,900	100	0.29	ND	D1	7.4
Trichlorofluoromethane	5,000	10,000	0.29	ND	D1	7.4
Vinyl Chloride	Not Available	26,000	0.17	ND	D1	4.3

\*A simple asphyxiant displaces air, lowering the partial pressure of oxygen and causing hypoxia at sufficiently high concentrations.

ppb<sub>v</sub> - Parts per billion by volume.

ND - Not detected.

NQ - Concentration can not be quantified.

LOD - Limit of detection.

SDL - Sample Detection Limit (LOD adjusted for dilutions).

INV - Invalid.

J - Reported concentration is below SDL.

L - Reported concentration is at or above the SDL and is below the lower limit of quantitation.

E - Reported concentration exceeds the upper limit of instrument calibration.

M - Result modified from previous result.

T - Data was not confirmed by a confirmational analysis. Data is tentatively identified.

D1 - Sample concentration was calculated using a dilution factor of 50.69

D2 - Sample concentration was calculated using a dilution factor of 200.54

D3 - Sample concentration was calculated using a dilution factor of 401.08

**Table 3. TCEQ Long-Term Air Monitoring Comparison Values (AMCVs)**

**Please Note:** The long-term AMCVs are provided for informational purposes only because it is scientifically inappropriate to compare short-term monitored values to the long-term AMCV.

Compound	Long-Term Health AMCV (ppb <sub>v</sub> )	Compound	Long-Term Health AMCV (ppb <sub>v</sub> )
1,1,1-Trichloroethane	940	Cyclopentane	120
1,1,2,2-Tetrachloroethane	1	Cyclopentene	290
1,1,2-Trichloroethane	10	Dichlorodifluoromethane	1,000
1,1-Dichloroethane	100	Ethane	Simple Asphyxiant*
1,1-Dichloroethylene	86	Ethylbenzene	450
1,2,3-Trimethylbenzene	25	Ethylene**	5,300
1,2,4-Trimethylbenzene	25	Isobutane	800
1,2-Dibromoethane	0.05	Isopentane (2-methylbutane)	8,000
1,2-Dichloroethane	1	Isoprene	2
1,2-Dichloropropane	10	Isopropylbenzene (cumene)	50
1,3,5-Trimethylbenzene	25	m & p-Xylene (as mixed isomers)	140
1,3-Butadiene	9.1	m-Diethylbenzene	46
1-Butene	Not Available	Methyl Chloride (chloromethane)	50
1-Pentene	Not Available	Methylcyclohexane	400
2,2,4-Trimethylpentane	75	Methylcyclopentane	75
2,2-Dimethylbutane (Neohexane)	100	Methylene Chloride (dichloromethane)	100
2,3,4-Trimethylpentane	75	m-Ethyltoluene	25
2,3-Dimethylbutane	99	n-Butane	800
2,3-Dimethylpentane	85	n-Decane	175
2,4-Dimethylpentane	85	n-Heptane	85
2-Chloropentane (as chloroethane)	19	n-Hexane	190
2-Methyl-1-Pentene +1-Hexene	50	n-Nonane	200

Compound	Long-Term Health AMCV (ppb <sub>v</sub> )	Compound	Long-Term Health AMCV (ppb <sub>v</sub> )
2-Methyl-2-Butene	50	n-Octane	75
2-Methylheptane	75	n-Pentane	8,000
2-Methylhexane	75	n-Propylbenzene	25
2-Methylpentane (Isohexane)	100	n-Undecane	55
3-Methyl-1-Butene	800	o-Ethyltoluene	25
3-Methylheptane	75	o-Xylene	140
3-Methylhexane	75	p-Diethylbenzene	46
3-Methylpentane	100	p-Ethyltoluene	25
4-Methyl-1-Pentene (as hexene)	50	Propane	Simple Asphyxiant*
Acetylene	2,500	Propylene	Simple Asphyxiant*
Benzene	1.4	Styrene	110
Bromomethane (methyl bromide)	3	t-1,3-Dichloropropylene	1
c-1,3-Dichloropropylene	1	t-2-Butene	Not Available
c-2-Butene	Not Available	t-2-Hexene	50
c-2-Hexene	50	t-2-Pentene	Not Available
c-2-Pentene	Not Available	Tetrachloroethylene***	3.8
Carbon Tetrachloride	2	Toluene	1,100
Chlorobenzene (phenyl chloride)	10	Trichloroethylene	10
Chloroform (trichloromethane)	2	Trichlorofluoromethane	1,000
Cyclohexane	100	Vinyl Chloride	0.45

\*A simple asphyxiant displaces air, lowering the partial pressure of oxygen and causing hypoxia at sufficiently high concentrations.

\*\*Long-term vegetation AMCV for Ethylene is 30 ppb.

\*\*\*Long-term vegetation AMCV for Tetrachloroethylene is 12 ppb.